

# Analysing the design process of an interactive music installation in the urban space

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## ABSTRACT

This study is part of a project that aims at documenting several examples of 20th and 21st century professional composers' practices in order to contribute to the understanding of music creative processes.

This 2 year study, conducted in collaboration with the composer Jean-Luc Hervé, examined the design process of an electro-acoustic music installation (a 'sound garden') located in a public park in central Paris. The installation is a collaboration between the composer and a landscape architects agency. Various different types of data were collected such as: traces of the composer's activity (notes, sketches, sound samples, and e-mails with other project participants); verbal reports and comments based on the composer's sketchbooks; and notes from the direct observation of electro-acoustic work session. Interviews with the composer were videotaped and transcribed (15 sessions, totalling more than 25 hours).

The aim of this paper is to briefly present some preliminary results of the study concerning: the instrumental role played by the administrative, political, musical and technical constraints that the composer faced throughout the project; composition as a model-based activity, versus activity as a dynamically situated activity; the distribution of control between the composer and the computer system.

## I. COMPOSING 'IN THE WILD': THE NATURALISTIC STUDY OF COMPOSITIONAL PROCESS

### A. Empirical studies of creative processes

For more than two decades the question of the feasibility of studying creative processes such as musical composition has been debated. For some authors such an attempt is at best questionable (Sloboda, 1985) and at worst deeply flawed.

The objection is partly supported by the discourse of some composers, including contemporary ones, and by a commonly held belief from the 19<sup>th</sup> century relating to the ineffability of creative process.

Still, during the last century some authors have attempted to develop an empirical approach of creative processes based on naturalistic studies. Gruber for example stresses the emphasis on case studies of creative processes performed in realistic contexts and not limited to the duration of an artificial creative session conducted in an experimental setting (Gruber, 1985). In the domain of musical composition we can draw from the seminal work by J. Bahle to the more recent efforts by Reitman, Collins, Delalande, and others (see Collins, 2005 for an informed and comprehensive review).

The question remains nevertheless open: to what extent is it possible to develop a scientific account of the compositional activity of professional composers? But first the very nature of this characterization must be clarified. What are we speaking about when speaking about compositional activity ?

What is the level of analysis of the phenomenon ? What are the relevant theoretical notions on which we can build a general understanding of the compositional process? Following from this, what are the most effective methods to be used?

In our perspective, musical composition can be best described as a situated, high-level cognitive activity involving complex processes requiring sophisticated skills and knowledge, and embedded in a cultural and social context, rather than as an idealized illustration of an idiosyncratic relation between an individual and his or her art. Similarly, music composition cannot be solely described as a collection of low level, sometimes inaccessible to consciousness, information processing mechanisms that can be described at a structural and functional levels. As such, it is ill-suited to being analysed by traditional computational psychology approaches, which are more appropriate for the study of low-level, sub-symbolic, encapsulated mechanisms.

This claim for a more integrative approach for understanding the experience of music has already been quoted in music psychology (Allesch & Krakauer, 2005-2006). Like these authors we believe that different approaches, from physiological to ethnographical accounts, in experiencing music are necessary or at least useful.

Our basic approach is to start from a phenomenological description associated with a comprehensive analysis of a professional composer's activity. Then, later on, to progressively focus on the 'scientific' side, i.e. identifying recurrent activity patterns supported by general mechanisms that may explain in a synthetic way the processes involved in composition. This identification of patterns and recurrent regularities may be achieved by systematically comparing results obtained from similar studies conducted with the same composer but with different pieces and/or with different composers.

### B. Which framework ? Composition as problem-solving or/and design practice

Putting aside traditional views of creative process as the expression of the aptitudes of talented individuals, different frameworks have been proposed to give account of the compositional creative process.

Following a tradition opened up by Newell and Simon's seminal works (Newell & Simon, 1972) creative activity can be considered as a special class of problem-solving activity. This conception has been widely adopted by many authors in the domain of compositional creative processes (Collins & Dunn, 2011); (McAdams, 2004).

The compositional creative process can also be considered through the prism of design activities studies since both areas share similar features – e.g. ill-defined, complex problems difficult to decompose into independent sub-problems; the existence of several acceptable solutions rather than one single solution; the systematic reuse of knowledge; an

opportunistic or “on-going openness” (McDonnell, 2011); and the structuring role played by material artefacts.

In addition, considering these common characteristics that transcend the boundaries of different design activities (Goel & Pirolli, 1992), one can assume that compositional activity is actually a cognitive design activity<sup>1</sup>. The fact that research on design activities and compositional activities have shared the symbolic information processing paradigm as an important reference is symptomatic of a proximity. However other analytical frameworks could be of interest, including for example the “naming – framing – moving – reflecting” descriptive model of design practices in which design is depicted as a “reflective conversation with the situation” (Schön, 1983).

The question of the specifics of the compositional activity imposed by the characteristics of the design situation may benefit from empirical studies of composition and from a comparison with results obtained in different domains. For example the artistic nature of the compositional activity has been quoted as a distinctive feature compared to more engineering-oriented design domains since it involves an emotional and aesthetical commitment.

### C. A particular example of tracking the compositional process “in the wild”: the analysis of the design of an interactive music installation

This study is part of a larger project that aimed at documenting several examples of 20th and 21st century professional composers’ practices in order to contribute to the understanding of music creative processes (MUTEC, 2012).

The purpose here is to adopt an empirical approach to the professional composition activity by drawing inspiration from cognitive anthropology, cognitive ergonomics (in the french-speaking tradition of activity analysis) and ethnography of professional settings. This type of approach has recently been exemplified in works of Donin, Theureau and their colleagues at the APM (Analysis of Musical Practices) Research Group at IRCAM.

The analysis of collected data is still in progress and the results will be published in an extended forthcoming publication. For this paper we briefly present the project, the method and some preliminary first results.

## II. THE ‘SOUND GARDEN’ PROJECT

Jean-Luc Hervé (born 1960) is a French composer whose works have been very well received for more than 20 years. He won many prizes and his works are played on a regular basis by well-known soloists and ensembles (Sillages and Court-Circuit to name a few). He was offered a residency in Berlin in 2003 under the DAAD programme and is currently a professor at the Boulogne-Billancourt Music Academy.

### A. Context

Some years ago, different composers were asked to propose a musical project together with landscape architects in order

to design a sound garden. The unusual nature of this project lies in the ordering of the phases of the process: the musical project came first; this was then implemented on paper as a landscape gardening project. Thus the place was (re)shaped according to the musical ideas of the composer. This can be compared with other traditional projects where artists start from an already existing place. After a selection phase, the project by J-L. Hervé and the Arpentère agency was chosen.

The installation is to be housed in the 4<sup>th</sup> administrative sector of Paris in Le Marais historical area (figure 1). This project represents an opportunity for the composer to pursue a reflection initiated many years ago concerning the relation between a musical work and its context of performance, outside of the traditional concert situation.

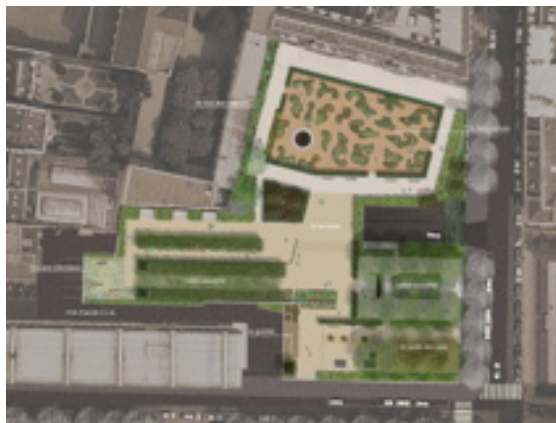


Figure 1. A birds eye view of the ‘garden project’. © Arpentère

### B. Principles

The project is designed according to three main principles: a seamless articulation between the sonic environment and music; the use of real-time computer generated music that continuously updates models designed by the composer; an interaction between atmospheric (i.e. brightness, hygrometry, wind speed, etc.) and social (presence and behaviour of the visitors) variations (figure 2).

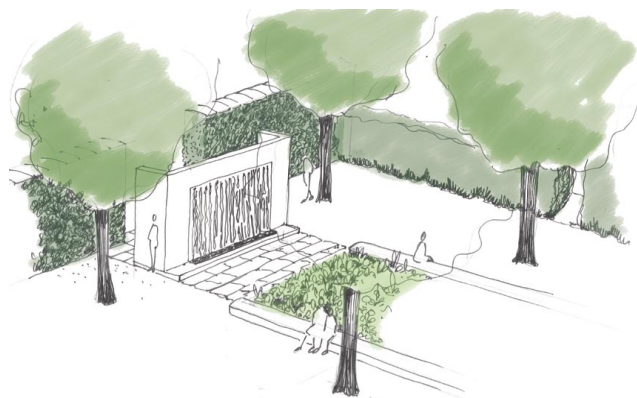


Figure 2. A detail from the sound garden: the so-called ‘Birds Wall’ (project). © Arpentère

<sup>1</sup> Anecdotically (Sloboda, 2005) in his chapter on “Music psychology and the composer” compares the composer to an architect.

### C. The different project phases from the composer's activity perspective

The project takes place over a period of 4 years that was split into three different stages:

- February 2007-August 2009: preparation and conceptual design of the artistic project.
- September 2009-February 2010: co-design of an electroacoustical implementation of the artistic project.
- March 2010-May 2011: post-compositional valorisation (articles, new pieces, radiophonic workshop).

## III. METHOD

### A. Previous productions of the composer

For many years, in parallel with his activity as a composer, Jean-Luc Hervé, has reflected on the theoretical nature of his work. His PhD thesis for example gives a relatively unique testimony of a composer involved in giving a reflexive account of his compositional practice (Hervé, 1999). In addition Hervé wrote many papers for reviews and newspapers, in which he explains the general ideas behind the sound garden project.

### B. Traces of the activity

Different traces of the composer's activity were collected including:

- Notebooks

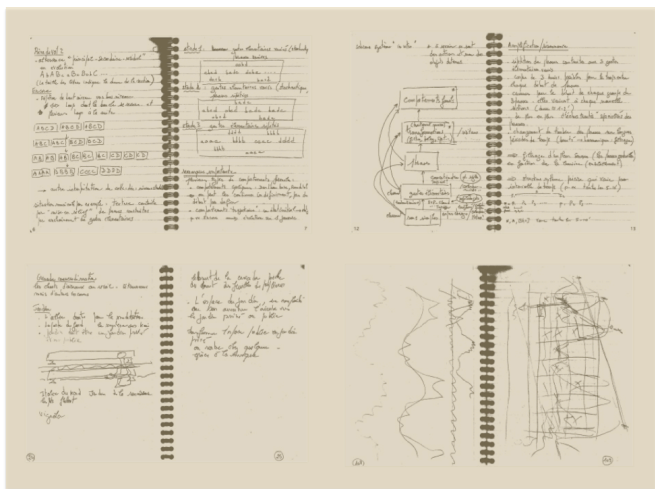


Figure 3. Examples drawn from the composer's notebooks. "Brown" Notebook, November 2008; "Black" Notebook, March, 2007.

- Sketches and schematic representation, mind maps
- Computer files outputs of electro-acoustical work sessions
- Audio-recordings of work sessions with the musical engineer
- E-mails exchanged between the composer and the different actors involved in the project

### C. Ethnographic accounts of the activity of the composer

We video-taped some electro-acoustical work sessions during which the composer was asked to concurrently report his thoughts. The use of video recording allows us to record both the musical sequences and sounds produced during the

on-going activity, and/or Hervé's comments on his previous work.

### D. 'Self-confrontation' interviews

The use of retrospective verbal reports to study compositional processes has been endorsed in different ways by few authors so far (see for example (Collins, 2007; Donin & Theureau, 2007) but with convincing results. It can be seen as an attempt to the limitations of thinking-aloud method stressed by different authors such as Sloboda (1995) and (McAdams, 2004).

Self-confrontation interviews can be seen as a variation of the retrospective reporting approach. This method aims at showing a subject a recording of his own activity in order to put him in the context of, or to re-enact a past experience. This idea of re-enactment is similar to the one promoted by historian R.G. Collingwood who stated that an 'historical understanding requires a re-enactment of past experience or a re-thinking of past thought' (Dray, 1995). The basic difference between Collingwood's approach and ours, is that in our case it is not the analyst (third person approach) who adopts a re-enactment posture but the composer himself aided by the mediation of the interviewer (second person approach).

Basically a subject (or a group of subjects) is confronted with traces of his activity, such as writings, sketches, annotations, automatic acquisition of actions on a computer system, or more frequently audio and video recording. The goal is to collect verbal reports that may be factual descriptions of the actions performed by the subject or general comments that allow the experimenter/analyst to give meaning to what has been done. At the same time, the analyst can control the correspondence between the verbal report produced by the subject and the traces of the activity being observed.

In our case, the composer was asked to comment freely on his notebooks, sketches, sound files, without any particular restriction (figure 4). The interviews were conducted by one or two interviewers, whose role was to re-focus the composer on the precise content of his past, present and sometimes planned activity.

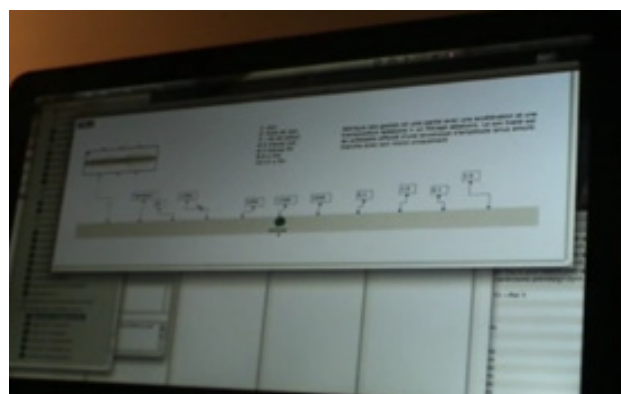
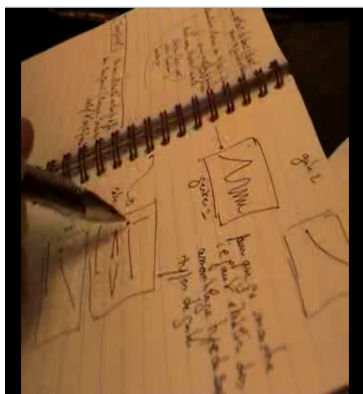


Figure 4. Self-confrontation interview. J-L. Hervé commenting a previous work session with OpenMusic (November, 2010).

This re-enactment situation is slightly different from the "interview within situation simulation through material traces" described by Donin & Theureau (2007) in their analysis of Philippe Leroux's *Voi(Rex)*. We did not intend to reproduce as closely as possible the characteristics of the composer's

familiar context of activity. Moreover, we did not focus on a particular moment of the compositional activity but intended to give a global picture of the process with punctual zooming on particular moments.

These interviews were carried out in different contexts, such as public spaces, the composer's home, or a work room at IRCAM. All the interviews were video-recorded and transcribed verbatim.



**Figure 5. Jean-Luc Hervé annotating his own notebook during a self-confrontation interview.**

It must be noticed that during some interviews, the composer took the opportunity to re-annotate his notebook in order for example to make a particular issue more explicit and easier to understand for the interviewer(s) (figure 5). This is a perfect illustration of the classical idea of 'co-constructing' data instead of merely collecting data; the actor directly participates in the interpretation of data by providing extra features.

#### IV. SOME PRELIMINARY RESULTS

The primary data used in the analysis are Hervé's verbal reports collected during the self confrontation interviews.

##### A. Composition as a model-based activity vs. composition as an improvisational effort

As an illustration consider the relationship between the expression of the compositional model by the composer and the more emerging nature of the selection of the sound material to be processed by the computer system.

In this project, according to the composer, a large part of his own activity can be defined as self-eliciting the compositional model. Composition here can be seen as the formal specification of what should be the functioning principles applied by the computer system in order to produce musical sequences that observe rules prescribed by the composer. The first step of Hervé's work was thus to describe a functional model of the expected information processing performed by the system. This step required an extensive reflexive effort from the composer. In order to do so, he revisited some of his own previous pieces in order to perform an in-depth analysis to extract some forms of regularities in his compositional practices.

The second step (performed more or less in parallel to the first one) was to define a set of sonic material (organized in a

database of sounds) that will be used by the system as a bound input upon which Hervé's compositional model as described by the composer himself will be applied. J-L. Hervé's idea here is to control the particular 'colour' of the musical outputs of the processing. This step is more traditional in the context of electro-acoustical composition in the sense that the composer's activity is mainly conducted by trial and error experimental sessions: he manipulates the parameters of a set of different selected basic sounds and examines the results. The part played by improvisation and the importance of the emerging phenomena is thus crucial since the composer can not systematically predict the result of the processing performed by the system (even though the functional principles applied are supposed to be known).

For J-L. Hervé this way of working is relatively original, even though he previously worked on a similar attempt to model his own compositional practices with a neural network learning system, with apparently less than satisfying results. Until now, he used to let the system generate some samples and then select some before beginning the composition. In the sound garden project, the system is supposed to be autonomous but the generated musical sequences must embody the composer's aesthetical project. This must be structurally and functionally implemented in the coupling between the input material (the sounds selected and organized by the composer) and the processing algorithm that implements the compositional model. At this point it is thus largely a question of balance between predictability and chance.

##### B. The instrumental role of constraints

During his activity in this project, and as in any design process, J-L. Hervé had to face numerous different types of constraints that had direct consequences on the way he made decisions and conducted his work. Some of these were imposed since they were not under the composer's control; others were self-imposed in the sense that they were decided by Hervé and were part of his compositional project.

To sum up these different constraints we can list:

- Aesthetical constraints

These self-imposed constraints are constituent elements of the composer's artistic project. His view of the system as an implementation of his own compositional practices imposes a line of thinking in the creative composition process. It also imposes a mode of relationship with other actors involved in the project. Different technical suggestions made by the musical engineer for example (selection of particular tools) were rejected because they did not fit these constraints – they emphasized model-based rather than random computer generated musical sequences. These constraints can thus be seen as "enabling" (McDonnell, 2011) from the composer's perspective as they help him to establish a framework and create coherence during the overall project.

- Constraints inherent to multi-activity situations

During the life span of this project Hervé was committed to other activities such as writing other pieces, concert rehearsals, negotiating new projects, writing articles and teaching, etc. Depending on the urgency of these others commitments, the work on the sound garden project had to be interrupted several times. Still the effect of these interruptions were not always

clear, it is likely that they introduced some rupture in the process whose concrete consequences are still to be assessed.

- Administrative, political and institutional constraints

On different occasions the project had to be stopped because of local political decisions in the context of elections for example. Surprisingly although this could have been interpreted as relaxing the constraints, it introduced a general feeling of uncertainty that led to a more divergent attitude (i.e. not focused on a well-defined objective associated to a ratified milestone). This was not considered as positive at these particular moments of the project. In the same vein, these interruptions, which lasted for several months sometimes, made it more difficult for the composer to get back into the current version of the system given its level of complexity.

Similarly, the rules that govern the setting up of a technical installation within any public space had to be considered. These constraints may have direct consequences on the project itself: for example the organization of the garden's spatial characteristics and the way the sound is diffused.

The design of the installation had to observe some constraints imposed by the institution (IRCAM) that partly funded the project. The installation has to be robust since frequently repeated breakdowns would have left a very negative impression with the public and media, and may damage the institution's reputation. This aspect had an indirect effect on the decisions made during the course of the project, including the type of system used to implement Hervé's formal model.

- Technical constraints

The set of tools available and generally used in the institution were not always well-suited to composer's objectives. Consequently he had to change from one tool to another which was sometimes difficult.

- Socio-cognitive constraints

One of the distinctive features of this project is that it involved a collection of actors who had to discuss, cooperate and negotiate in order to achieve the objectives of the project. The central actor was of course the composer himself. However, he had to work with many other individuals and institutions throughout the project. One of these key actors was the musical engineer who was in charge of supporting the computer implementation of the model designed by Hervé. The engineer brought to the project his own skills and experience of previous projects as well as his personal representation of what should be the most effective technical way to reify Hervé's initial idea. The emphasis he put on particular factors, such as robustness and re-usability, meant that he favoured solutions that had proved reliable in previous contexts, but that did not fit the composer's current objectives. Had these different priorities been accepted by the composer it would have affected his original conception of what the installation would look like and how it would work. This misalignment of priorities and representations led to numerous exchanges between the two actors and required Hervé to be explicit about some aspects of his thinking using sketches, metaphors and sound samples.

### C. The computer system as a mediating artefact

In order to be effective in a public place (the garden), the functional model described by J-L. Hervé has to be implemented in a real-time system that will use a set of

samples designed and selected by the composer. The critical issue here was the coupling between this prescriptive modelling, which preserves the composer's original aesthetic idea, and the variability introduced by the system, i.e. the different interpretations it will perform of the same samples. This distribution of control by design between the composer and the computer implementation of Hervé's conceptual model was clear at a certain level of abstraction. However, the results produced by the system can not be pre-determined. That is, the quality of the musical outputs generated by this coupling remained largely uncertain and difficult to anticipate. In order to fill this gap, J-L. Hervé used a set of different tools as transitory artefacts that helped him to evaluate the results and subsequently make decisions concerning the effectiveness of the processing and the relevance of the selected samples. These tools were off the shelves commercial tools (e.g. Pro Tools, Live), IRCAM proprietary tools (Max/MSP, OpenMusic), and tools specially designed by the musical engineer associated with the project.

## V. CONCLUSION

The original character of this project, both from the composer and researchers' side, makes it an intriguing and challenging situation for empirically documenting the compositional creative process. The general approach adopted all through this study was not to reduce the complexity of J-L. Hervé's multi-faceted activities. Consequently this led to depicting his compositional process as a design activity that articulates different concerns over an extended time span. Some parts of this activity may appear as secondary, even mundane, compared to traditional studies on compositional creative processes that are more focussed on electro-acoustical work or writing scores. However we showed that these features had direct or indirect consequences on the composition process, and accordingly must be considered.

A next objective of this research will be to confront and compare our results with those obtained in other studies conducted with different composers. This will allow us to assess the generality of the results of our current study.

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